OCR
Oxford Cambridge and RSA

GCSE

Design and Technology: Industrial Technology

General Certificate of Secondary Education **J304**

OCR Report to Centres June 2014

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This report on the examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the examination.

OCR will not enter into any discussion or correspondence in connection with this report.

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A541 Introduction to designing and making

General Comments:

Entry numbers have shown a small increase when compared with those of July 2013. Only one entry was made this year on the Repository. Several centres, however, submitted their work electronically, either on CD or memory stick which were sent directly to the moderator. If this approach is chosen, and it does have many features to commend it, the preferred format is that each candidate's portfolio is sent as one file. It is a time-consuming task if photographs of all the candidate's work are sent together as one file which has to be opened and searched through to select the individual candidate's images separately from their portfolio of work. Individual cover sheets can be sent electronically, but are perfectly acceptable as hard copies, sent in the post, even if the asspciated work is submitted in an electronic format. It is preferable for centres to use Microsoft PowerPoint for producing e-portfolios. These can then either be submitted in PowerPoint format or converted to PDF documents. Hard copies of candidate's work are still the preferred option for the majority of centres.

Centres that are preparing candidates for this examination must ensure that they read their Centre Report from the previous year, together with the report from the Principal Moderator. These reports highlight any problems with the centre's submission, together with problems encountered with the entry as a whole for this unit. It is apparent that some centres are not reading these reports and acting on the guidance and comments made, as they are repeating the same errors year on year and this is not beneficial to their candidates.

Several centres submitted work before the deadline date and this is helpful. Centres are reminded that they should not send candidates' coursework to the moderator until they are requested to do so by an automatically-generated email. This email will not be generated until the centre has submitted their marks and they have been put onto the system. Only the work of the candidates requested is required.

Centres were generally correct with the submission of their accompanying paperwork, but they are reminded that they should include a Cover Sheet for each candidate and an MS1 mark sheet, together with a CSF160 form that contains the breakdown of marks for ALL their candidates, not just those that are selected for moderation.

Many centres continue to offer a very limited range of tasks for candidates to select from for their Controlled Assessment task. The use of writing frames has now fortunately almost disappeared.

Centres are reminded that they should not be teaching for the Controlled Assessment Task, or marking and correcting work in progress, or offering feedback on how work can be improved.

Over marking the work of their candidates is still in evidence at some centres.

Centres are reminded that this unit is an introduction to designing and making and the Controlled Assessment should represent 20 hours of work. Many candidates are clearly exceeding this and centres should operate effective monitoring of the time spent on the Controlled Assessment task.

Creativity

There are still many instances where candidates from some centres are producing copious quantities of research that is not being used to focus and inform their later design thinking. The most successful and useful research is that where each section is analysed and then conclusions drawn from that particular piece of research. Too much work is included by many

candidates that is not relevant to their topic. It is difficult in many cases to see how the research completed has identified 'principles of good design and technological knowledge' and also to 'identify trends in existing solutions'. Candidates must use this information to guide their design thinking. There is clear evidence in the highest-scoring candidates' work of how their research has informed their designing.

Candidates who did well in this section

- Clearly identified the chosen problem.
- Recorded their conclusions from investigations and research.
- Thoroughly analysed two existing products.
- Identified common good design features and explained the trends they had recognised in these products.
- Used this work to produce a Design Brief that clearly indicated the problem, intended users and situation.
- Indicated sources of information.

Designing

There were some excellent examples of high quality graphics in evidence.

Candidates who score highly on this section show evidence of a series of common trends. They use a variety of graphic skills to produce a range of design ideas. Their ideas are creative and flow from their research. They use further graphic skills to develop their idea. An effective and correctly-drawn working drawing is included in their submission. Good and relevant use is made of CAD. Modelling is used effectively to help generate a final design. Many candidates now make good use of free CAD software like Google SketchUp, as well as more established programmes like ProDesktop.

There were many good examples of design development this year, where candidates were clearly showing progression from an initial idea to a working drawing. This is essential in the process and effective development leads to a quality product during the making stages.

Candidates are using modelling more frequently now and this is also supporting their progress into making. Models are often simple 2D examples, which may show the effectiveness of a mechanism, but candidates are also showing more evidence of 3D modelling using resistant materials and CAD software.

Design ideas are not always well annotated or detailed and often contain no information regarding construction, sizes or materials. Too many candidates are only producing design ideas using very limited methods, perhaps just computer-drawn images using graphics or drawing software. However, many excellent examples of working drawings are now being seen, mainly produced using CAD software.

Candidates who did well in this section

- Used their analysis of research to produce an effective, clear, objective design specification.
- Then produced a range of well presented, annotated and evaluated ideas using a variety of techniques.
- Developed a design effectively and used ICT where appropriate to aid their designing.
- Used modelling to good effect to develop a design or aid design thinking.
- Produced a good quality dimensioned working drawing.

Making

Good examples of practical outcomes were much in evidence and all candidates had some making work for assessment. There were few examples seen this year of unfinished practical work. Work ranged from MDF prototypes through CAD/CAM produced outcomes to high quality engineered examples in metal. The best work seen had a detailed work plan that was effective at guiding the candidate through the making processes. Correct tools and techniques were used to produce a completed prototype of good quality in an appropriate material.

Many candidates lost marks because there was little or no evidence in their portfolios of problems that they had encountered and how these had been resolved in order to progress the work forward. Centres are once again reminded that there must be evidence in the portfolio if marks are to be awarded for this strand of the assessment criteria. Many candidates successfully include this as additional columns in a work plan. They plan what they are going to do, how it will be approached and the tools and equipment to use, but then include problems they encountered on those stages and how they modified and adapted their planning and making to overcome the problems encountered.

Candidates generally continue to do well at recording the progress of their work using both notes and digital images to record the making sequence. What is required in this section is recording the making as it happened and *in situ*. It is not intended to be a simple photograph of a finished component and then an explanation of how that component was made.

Candidates who had used components produced by CAD/CAM software often had very little evidence in their portfolios of this process and they often showed a lack of knowledge of the designing and making process that had been used.

Centres are reminded that there should be at least 2 or 3 good quality images of the candidate's finished prototype. These should preferably be included at the end of the candidate's portfolio, rather than as a collection of images in a separate file of all candidates' work.

Candidates who did well in this section

- Commenced with a realistic, effective Design Specification.
- Planned their making effectively recording process, resources, time and safety issues.
- Had evidence of what problems had arisen during the making and how these had been overcome. Candidates sometimes combined this with forward planning to good effect.
- Recorded the work in progress with annotated photographic images.
- Produced an effective, feasible, good quality prototype

Critical Evaluation

Again this year, this is the section that is the least successful with many candidates. They continue to evaluate the finished product. This is not required in A541. They should be evaluating the making process and reflecting on how the modelling and prototyping process could be improved. There should be evidence of good use of appropriate terminology. Considerable marks were lost in this section by many candidates, who had simply evaluated their completed practical piece. Centres should ensure their candidates are fully aware of what is required in this section.

Correct use of specialist technical terms is also not well attempted by many candidates.

Candidates who did well in this section

- Effectively evaluated the designing and making process.
- In so doing, were able to identify how the designing, modelling and planning stages could have been improved.
- Used correct specialist terms throughout their folder
- Used spelling, punctuation and grammar correctly in the whole of their folder.

A543 Making quality products

This report should be read together with that for A541, as comments often overlap.

General Comments:

The majority of centres managed to submit their marks by the deadline date of May 15th. Centres were also prompt at sending work to moderators once they had received the requesting email. Paperwork was generally in order, but centres are reminded that each candidate should have a cover sheet and that an MS1, CCS160 and CSF form should be submitted.

Hard copy paper portfolios in either A3 or A4 format are still the most common form of submission, but several centres are now well into electronic submission of work, on either CD or USB memory stick. The repository still remains the least favoured vehicle for the submission of work.

Centres must ensure that they read their own Centre Report on this unit, together with the Principal Moderator's Report for the June sitting. These offer specific recommendations and observations to the Centre as well as general comments on how work can be improved, things to avoid and what evidence examiners are looking for.

Digital images of the completed piece of work were not always of a high enough quality. Many images were far too small, particularly those embedded into A4 format paper portfolios.

Designing:

Many candidates are producing far too much research, not all relevant, for this unit. Research that is included should be relevant and clear conclusions should be made as a result of what has been investigated. It should lead to a realistic specification.

Good quality work was in evidence in other aspects of designing, but centres are reminded that candidate work should include a variety of methods/media in conveying design information if high marks are to be awarded. The most successful candidates started from an effective and realistic Design Specification and produced a range of good quality ideas using a variety of media and strategies. They were annotated and evaluated and showed construction and material details.

Candidates used development work this year far more frequently and effectively than in past sittings. They used drawing, modelling and CAD to good effect in many cases. There were many excellent examples of the use of CAD included from several centres.

Making:

Many examples of good quality work were in evidence that demonstrated a variety of high quality making skills using appropriate materials. All candidates had some level of practical outcome.

Planning was usually competently completed and levels of terminology were at a much higher level in this unit.

As in A541 however, centres were awarding marks for solving technical problems when there was a lack of evidence in the portfolio. Candidates must identify problems that arose during the

manufacturing stage and explain in detail how these were overcome, in order to complete the making.

The majority of candidates recorded the making effectively as it progressed, using both written and photographic evidence to show the stages, tools and processes that they used.

Digital images of the completed practical work are improving, but there are still too many instances of small, poor quality pictures, often printed at low resolutions. It must be pointed out that if using an A4 format portfolio, small images on one part of the page are insufficient to convey the information required and to do the work justice. There were some instances where there was no image at all of the completed work included in the folder.

Critical Evaluation:

This section was far more successful for the majority of candidates when compared with the results for the same section in A541.

The most successful candidates evaluated their completed project against their own criteria as set out in their Design Specifications. They tested the product, documented and photographed the tests and showed examples of the results. For example, samples of embossed card were included in the portfolio from those that had designed and made an embossing tool.

Candidates were usually competent at identifying weaknesses in their product and suggesting design developments/modifications that would improve their product.

The correct use of technical terms and the appropriate quality of written communication is still an issue for some candidates.

A545 Sustainability and technical aspects of designing and making

General Comments:

The majority of candidates attempted all of the questions on the examination paper and a number of very good responses were presented. It was evident, however, that candidates had not always read questions carefully, resulting in inaccurate or inappropriate responses. It is most important that candidates take time to read through the question paper thoroughly before attempting to answer questions, in order to avoid such basic errors.

Section A was generally well answered by most candidates, and sound knowledge of general sustainability issues was demonstrated in many of the responses seen. This was not the case in questions relating to recycling, however, where there seemed to be a considerable amount of confusion between the three main types, primary, secondary and tertiary.

Candidates' knowledge of the use of basic hand tools showed improvement over previous sessions, but their knowledge and understanding of processes used in the school workshop was generally quite limited. Responses to questions relating to processes used in industry showed that knowledge of high-volume production processes was also rather weak in many cases.

Sketches produced for responses to the design questions were generally of rather poor quality. It is most important that sketches are clear and suitably annotated, as examiners must be able to readily interpret a candidate's design ideas in order to award marks appropriately.

Comments on Individual Questions:

Question Nos 1 - 15.

These one-mark questions were mostly answered correctly, with the following notable exceptions:-

1	A significant number of candidates incorrectly gave (a) as the meaning of the 6R 'Rethink' rather than the correct response of (b).
4	Less than half of the candidates recognised Polypropylene as the material on which the recycling symbol is found.
5	Most candidates gave the correct response of Carbon offsetting, but Carbon assessment was also often seen.
6	Only a limited number of candidates gave the correct response of primary recycling. In many cases candidates answered by giving one of the 6Rs rather than a type of recycling.
16(a)(i)	Few candidates gave the correct answer of tertiary recycling, with primary recycling being the most common response. In a significant number of cases, no response at all was given to the question, indicating some confusion in this basic issue.
16(a)(ii)	This question was generally not well answered. Marks were lost where the candidate had not specified aluminium when referring to 'cans', or had suggested a product made from a plastics material.

16(b)(i) Most candidates attempted this question and some higher achieving candidates gave detailed responses that made reference to managed forests and the FSC. Simplistic references to re-planting trees gained only one of the two marks available.

16(b)(ii) This question was well answered by most candidates and some well-annotated sketches were seen. Marks were occasionally lost where one of the three specification points had not been met.

16(c) Most candidates were able to give at least one disadvantage of a wooden bollard compared with those made from the other materials. The fact that the wood could rot was one popular response, as was the safety aspect of wood potentially splintering. A small number of candidates lost marks by missing the focus of the question completely and simply comparing the plastic and aluminium bollards.

16(d)(i) This question was generally well answered, although a number of candidates did not offer any response at all. Some very detailed responses were presented by the higher-achieving candidates, with references to transport costs, pollution and work for local people frequently appearing.

16(d)(ii) It was quite surprising to see that a number of candidates did not attempt this question. The most popular correct response related to the cheapness of having products made in the Far East, but a few candidates made reference to the ready availability of resources and raw materials.

16(e)* Most candidates attempted this question, and marks across the whole range were awarded for responses presented. In many cases the responses were related quite simply to one specific issue, such as pollution caused by the extraction of raw materials, but some quite detailed responses covering a range of issues were also seen. Quality of Written Communication (QWC) marks were awarded for responses that were presented well despite technical content being rather limited.

17(a) It was encouraging to see an improvement in responses to questions relating to tools when compared with previous sessions. All candidates scored at least two marks on the question, and a significant number gained full marks.

17(b)(i) Responses to this question were very disappointing, and a significant number of candidates did not even attempt it. Only the chuck was identified correctly with any frequency, and in many cases it appeared as if the parts had been identified by simple guesswork. Only a small number of candidates scored more than half marks on the question, with the headstock being the least well known part.

17(b)(ii) This question was generally well answered with more than half of the candidates scoring full marks on it. The use of Personal Protective Equipment (PPE) formed the basis of most responses, but references to other relevant precautions were also seen.

17(c) Although most candidates attempted this question, detailed explanations were rare, and only the higher achieving candidates scored two marks or more. Most responses consisted of rather simplistic references to CNC machines being quicker than manual machines, without any mention of the consistency of accuracy that CNC machines produce.

18(a) It was both disappointing and rather surprising to see so few marks being scored on this question about the vacuum forming process, and a number of candidates did not even attempt a response. Marks were awarded for relevant stages in a workable sequence but, in a number of cases, no mention was made of softening the sheet of

plastic or bringing the mould into contact with the material. Only a small number of the higher-achieving candidates scored more than half marks on the question, and marks were frequently lost by simply presenting an entirely unworkable set of stages.

18(b) Most candidates scored some marks on this question but, again, a considerable number did not offer a response at all. Understanding of CAD and CAM as separate entities was generally good, but few candidates made any reference to the linking of the software from CAD to the CAM machines.

18(c) The standard of responses to this design question was very mixed, with only a limited number of candidates gaining good marks. Marks were awarded where a design solution met each of the four specification points for the jig and, in most cases, marks were restricted to one or two. Only a small number of candidates recognised the need to support the base from below to prevent damage when drilling, and accurate positioning of the holes was also quite rare.

18(d)(i) This question was not well answered generally, with most candidates scoring one mark or less on it. Where marks were lost, this was almost invariably due to the fact that candidates had missed the focus of the question and presented benefits to the user rather than the manufacturer.

18(d)(ii) It was again both disappointing and surprising to see so many candidates scoring no marks on this question, with some not even attempting a response. Less than half of the candidates gave the correct response of either injection moulding or extrusion as an appropriate high-volume production process for products made from thermoplastics.

19(a) This question was generally well answered, with most candidates being able to choose appropriate materials from the list to complete at least two of the statements. Cast iron and stainless steel were both seen as examples of ferrous metals, and carbon fibre and GRP were equally popular as examples of composites. Where marks were lost, this was normally as a result of giving an incorrect example for an alloy, with copper being frequently seen. A number of potentially correct answers were available for this statement, including stainless steel and cast iron.

19(b) Some very detailed responses to this question were seen, and more than half of the candidates scored full marks on it. In almost all cases, the three elements of the correct response, mixture, metal and no iron, were all clearly presented.

19(c)* Responses to this question were very varied, and marks across the whole range were seen. Most responses focussed mainly on the advantages of using plastics, with little reference to either disadvantages or comparisons with using metals. In some cases, advantages of using metals formed a large part of the response and references to plastics were limited to comments relating to ‘ease of recycling’ and ‘cheapness’. A relatively small number of higher level responses made reference to the ease of producing shaped parts in plastics, and their particular suitability for high-volume production. Quality of Written Communication (QWC) marks were awarded for responses that were presented well despite technical content being rather limited.

19(d) Very few candidates demonstrated any detailed knowledge of the JIT system of manufacturing, and most responses consisted of rather simplistic references to the lack of the need for storage of parts or products. Only a very small number of candidates mentioned other benefits, such as the increased production capability and the quality assured delivery of parts from suppliers.

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